May 23, 1967 J. P. ZAIDAN 3,320,629

VACUUM CLEANER NOZZLE

Filed March 23, 1965

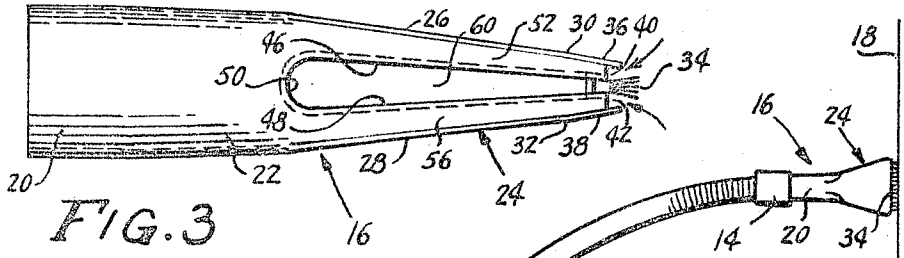

FIG. 3

FIG. 1

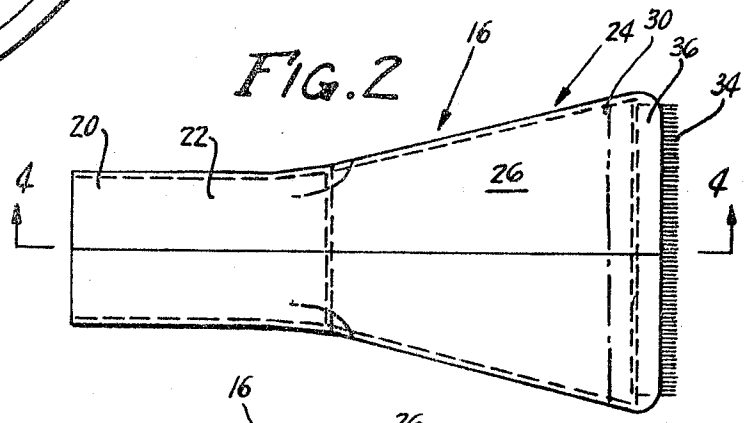

FIG. 2

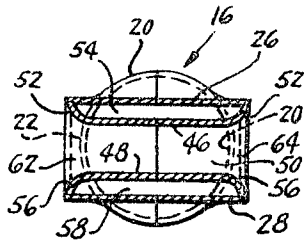

FIG. 5

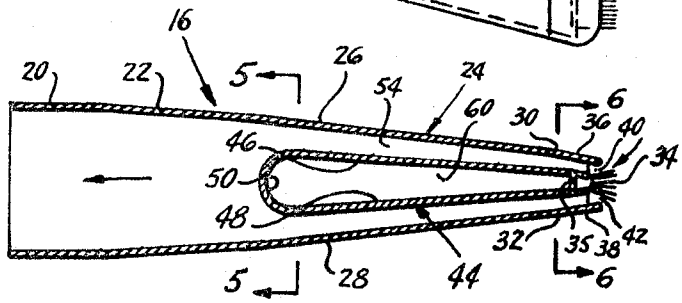

FIG. 4

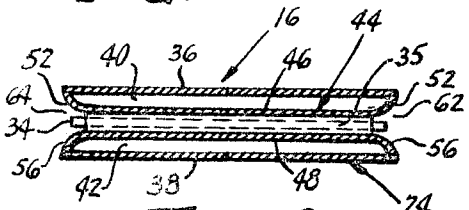

FIG. 6

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VACUUM CLEANER NOZZLE

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This invention relates to vacuum cleaners, and more particularly to an attachment which may be readily secured to the suction hose of a conventional vacuum cleaner, such as a tank type vacuum cleaner or a bag and stick vacuum cleaner equipped with a suction hose. Alternately the attachment may be connected directly to a battery-powered hand-type suction device if desired.

It has been known generally in the prior art to equip a suction hose of a vacuum cleaner with a vacuum cleaner attachment having various configurations of brushes and suction inlets. It has been found that one difficulty common in such existing attachments is that an insufficient air velocity is created and maintained from a point adjacent to a brush secured to the attachment to a point far rearwardly of the air and dust inlet opening. Another common difficulty found in existing vacuum cleaner attachments is that the air and dust inlets are commonly not positioned in an appropriate location with respect to an agitating brush.

It is accordingly an object of the instant invention to overcome the above-mentioned difficulties.

It is another object of the instant invention to provide an improved vacuum cleaner attachment which creates a high air velocity across an adjacent agitating brush.

It is a further object of the instant invention to provide an improved vacuum cleaner attachment which maintains a high air velocity throughout a major portion of the length of the attachment.

Another object of the instant invention is to provide a vacuum cleaner attachment having substantially identical suction inlets strategically positioned on opposite sides of an agitating brush.

A still further object of the instant invention is to provide a vacuum cleaner attachment which may be easily and inexpensively manufactured, used for long periods of time without maintenance, and which is efficient in use.

Other objects and advantages of the instant invention reside in the combinations of elements, arrangements of parts and features of construction, all as will be more fully pointed out hereinafter and disclosed in the accompanying drawing, wherein there is shown a preferred embodiment of this inventive concept.

In the drawings:

FIGURE 1 is a view of a vacuum cleaner having a suction hose onto which is secured a vacuum cleaner attachment according to the principles of the instant invention;

FIGURE 2 is a plan view of the vacuum cleaner attachment shown in FIGURE 1;

FIGURE 3 is a side elevational view of the vacuum cleaner attachment shown in FIGURE 2;

FIGURE 4 is a longitudinal sectional view taken substantially along line 4—4 of FIGURE 2 and viewing in the direction of the arrows;

FIGURE 5 is a transverse sectional view of the vacuum cleaner attachment shown in FIGURE 4 taken substantially along line 5—5 thereof and viewing in the direction of the arrows; and

FIGURE 6 is a transverse sectional view of the vacuum cleaner attachment shown in FIGURE 4 taken substantially along line 6—6 thereof and viewing in the direction of the arrows.

Referring now in detail to the drawing, wherein like reference characters designate like elements throughout the several views thereof, there is shown generally at **10** a vacuum cleaner, which may be of the tank type or of the stick and bag variety, having a suction hose **12** conventionally secured thereto. Attached to a collar **14** on the inlet end of hose **12** is a vacuum cleaner attachment shown generally at **16** in the process of cleaning a vertical surface such as a wall **18**.

Vacuum cleaner attachment **16** is made of any suitable material, such as a metal or a plastic, and comprises a rearward tubular outlet section **20** which is of a size to be conveniently received in collar **14** of suction hose **12**. An intermediate section **22** connects tubular outlet **20** to an inlet section shown generally at **24** which is trapezoidal shaped in plan as shown in FIGURE 2. Inlet section **24** comprises a pair of outer walls **26** and **28** which converge forwardly from intermediate section **22** to a transverse plane through points **30**, **32** rearwardly of an interiorally mounted brush support **37** which carries a brush **34**. A pair of transverse plates **36**, **38** converge at a more rapid rate from plane **30**, **32** to a common plane intermediate and perpendicular to brush **34** thus providing a pair of air inlets **40**, **42** which extend transversely on opposite sides of brush **34** and are of narrow width.

Positioned between walls **26**, **28** is an air velocity control means shown generally at **44** comprising a pair of inner walls **46** and **48** which in the cross section diverge rearwardly as shown in FIGURE 4 and which are connected by a half cylinder **50**. As shown in FIGURES 5 and 6, the lateral edges of inner wall **46** are turned upwardly to form side edges **52** which merge with outer wall **26** and plate **36** in order to form one vacuum air passage **54**. In a like manner, the outer edges of inner wall **48** are turned downwardly as at **56** to merge with outer wall **28** and plate **38** to form the second vacuum passage of a pair of substantially identical vacuum passages.

As indicated by comparison of FIGURES 4, 5 and 6, it will be seen that the cross-sectional area of vacuum passages **54**, **58** will remain substantially constant throughout their length. This is made possible by the converging-diverging relationships within the interior of inlet section **24** wherein the vertical height of each of the air passages increases rearwardly while the transverse width decreases rearwardly. As pointed out more fully hereinafter this relationship provides a substantially constant air velocity from a point rearwardly of brush **34** to intermediate section **22** which is a great distance from brush **34**. Of course, the greater converging rate of plates **36**, **38** creates a smaller cross-sectional passageway adjacent brush **34** thus creating an area of higher air velocity to induct dust into the attachment.

As shown in FIGURE 4 brush **34** has a metal retainer or back **35** around the end thereof which is of a configuration to be transversely slidable into and out of brush support **37** and retained therein against longitudinal movement. Thus, it is seen that a non-functional transverse slot **60** extends through the center of inlet section **24**, the open ends **62**, **64** of which may be closed in any suitable manner. As shown in FIGURES 2 and 6, the lateral edges of brush **34** do not extend completely to the edges of inlet section **24**. By providing an air inlet about the opposite surfaces of brush **34** it will be seen that any dust stirred up thereby will be drawn into the interior of vacuum cleaner attachment **16** with the path of inflowing air being shown by the arrows in FIGURES 3 and 4.

As previously indicated, one important feature of the instant invention is the size relationship betwen the cross-sectional areas of passageways **54**, **58**, the length of those passageways, the width of brush **34**, and the size and position of air inlets **40**, **42**. It has been found that a brush width of between two inches and four inches with equally sized upper and lower air passages between ⅛

inch and ⅜ inch in height at the forward end thereof and of a length at least as great as the brush width with plates **36**, **38** being between ½ inch and 1½ inch in length is a most advantageous form of construction.

In the use of the vacuum cleaner attachment according to the instant invention, vacuum cleaner attachment **16** is secured on the end of a suction hose **12** of a customary vacuum cleaner **10**. The conventional motor of vacuum cleaner **10** is turned on resulting in the flow of air through attachment **16** and suction hose **12**. Attachment **16** is then placed adjacent the area **18** to be cleaned with brush **34** being rubbed lightly thereacross, resulting in the dislodgement and agitation of dust and the like. Although such dislodgement normally occurs forwardly of brush **34** as it is being moved across surface **18**, there will be some agitation of material behind brush **34**. Since air inlets **40** and **42** are positioned on both sides of brush **34**, any dust or the like so dislodged will immediately be drawn into the interior of cleaner attachment **16**. Since passageways **54** and **58** are of substantially constant cross-sectional area throughout their length the velocity of air entering inlets **40** and **42** will remain substantially the same until the velocity of air enters intermediate section **22**. This results in the rapid and efficient movement of the air-dust stream away from brush **34**, providing efficient and economical use of the cleaner attachment. The length of passageways **54**, **58** insures that the high velocity stream continues to a point far rearwardly of brush **34** thus precluding any dust from dropping out of the stream adjacent brush **34**. The air-dust mixture so drawn into cleaner attachment **16** will travel through suction hose **12** and vacuum cleaner **10** in the customary manner.

From the foregoing, it will now be seen that there is herein provided an improved vacuum cleaner attachment, which accomplishes all of the objects of this invention and others, including many advantages of great practical utility and commercial importance.

As many embodiments may be made within this inventive concept, and as many modification may be made in the embodiment hereinbefore shown and described, it is to be understood that all matter herein is to be interpreted merely as illustrative and not a limiting sense.

I claim:

1. A vacuum cleaner attachment comprising a nozzle having an inlet section and an outlet section, means for attaching said outlet section to the suction hose of a vacuum cleaner, said inlet section comprising a pair of spaced apart inner walls, a pair of outer walls one on each side of the outer side of said pair of inner walls, and side walls connecting an inner wall with its adjacent outer wall defining two spaced apart vacuum passages, said inner walls being so related to said outer walls as to define air passages of substantially uniform cross sectional area throughout their full extent, each passage having a suction opening at its end, an elongated brush support extending between said inner walls adjacent and between the suction openings, and an elongated brush carried by said brush support.

2. The structure of claim **1** wherein said brush support includes a transverse channel and said brush includes a back having a configuration to slide within said channel, the ends of said channel being open to permit transverse insertion and removal of said brush from either end of said brush support.

3. The structure of claim **1** wherein said inner and outer walls diverge in plan away from said outlet section and converge in cross section toward said inlet section and terminate in a common plane to provide said uniform cross sectional area.

4. The structure of claim **3** wherein said outer walls are provided with projecting flanges extending beyond the ends of said inner walls, and overlying a portion of said brush.

5. The structure of claim **4** wherein said flanges converge inwardly toward said brush.

6. The structure of claim **5** wherein the convergence of said flanges is at an angle more acute than the convergence of said outer walls.

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